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Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

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Date	11 March 2008	Reg. No.	41,234

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Typed or printed name	John J. Oskorep, Esq.	Date	11 March 2008

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of:		)		
	Baer et al.	)	Art Unit:	1763
App. No.:	10/675,697	)	Examiner:	Arancibia
Filing Date:	09/30/2003	)	Docket No.:	HSJ9-2003-0032US1

For: "METHOD OF FORMING A READ SENSOR USING PHOTORESIST STRUCTURES WITHOUT UNDERCUTS WHICH ARE REMOVED USING CHEMICAL-MECHANICAL POLISHING (CMP) LIFT-OFF PROCESSES"

MAIL STOP APPEAL BRIEF – PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF (*Corrected*)

The Applicants respectfully submit this **Appeal Brief (*Corrected*)** in response to the Notice Of Non-Compliant Appeal Brief mailed on 20 February 2008, the Advisory Action of 25 September 2007 and the Final Office Action of 05 April 2007 for the above-referenced patent application.

APPEAL BRIEF (*Corrected*)

1. REAL PARTY IN INTEREST

The real party in interest is the Hitachi Global Storage Technologies Netherlands, B.V., the sole assignee of the present application.

2. RELATED APPEALS AND INTERFERENCES

There are no related appeals and interferences associated with this application.

3. STATUS OF CLAIMS

All pending claims 1-2, 4, 6, 8-16, 18, and 21-30 of the present application are being appealed and are provided for in Section 8, the Claims Appendix. Claims 1-2, 4, 6, 8-16, 18, and 21-30 stand finally rejected as indicated in the Advisory Action of 25 September 2007 as well as the Final Office Action of 05 April 2007.

4. STATUS OF AMENDMENTS

Claims 1-2, 4, 6, 8-16, 18, and 21-30 were last amended by the Applicants in the Amendment And Request For Reconsideration mailed on 22 June 2006 with a Request for Continued Examination (RCE), which was followed by the Request For Reconsideration (without claim amendments) on 16 January 2007 and the Request For Reconsideration (without claim amendments) on 10 September 2007. These pending claims 1-2, 4, 6, 8-16, 18, and 21-30 are provided for in Section 8, Claims Appendix, of the present Appeal Brief.

5. SUMMARY OF CLAIMED SUBJECT MATTER

Summarized below are the three (3) independent claims on Appeal, namely, independent claims 1, 12, and 23.

A. Summary of Independent Claim 1. Independent claim 1 relates to a method for use in forming a read sensor for a magnetic head. A chemical-mechanical polishing (CMP) protective layer 202 of FIG. 4 is formed over a plurality of read sensor layers (step 104 of FIG. 1) (see e.g. page 6 at lines 25-30). Subsequently, a first photoresist structure 302 of FIG. 5 is formed in a central region over the read sensor layers (step 106 of FIG. 1) (see e.g. page 7 at lines 1-19). A reactive ion etching (RIE) 304 of FIG. 5 is then performed to remove end portions of the CMP protective layer in end regions which surround the central region without removing any of the read sensor layers (step 108 of FIG. 1) (see e.g. page 7 at lines 20-26), to thereby leave intact both a central protective portion of the CMP protective layer underneath the first photoresist structure and the read sensor layers. After performing the RIE and leaving the read sensor layers intact, an ion milling 406 of FIG. 6 of the read sensor layers is performed such that end portions of the read sensor layers are removed in the end regions and a central sensor portion remains underneath the first photoresist structure, to thereby define a stripe height for the read sensor (step 110 of FIG. 1) (see e.g. page 7 at lines 27-30 to page 8 at lines 1-33). An insulator layer 602 of FIG. 8 is formed around the read sensor where the end portions were removed (step 112 of FIG. 1) (see e.g. page 8 at lines 4-12). The first photoresist structure 302 of FIG. 9 is then removed through mechanical interaction with a CMP pad by compressing the first photoresist structure with the CMP pad until it reaches a top surface of the CMP protective layer (step 116 of FIG. 1) (see e.g. page 8 at lines 20-27), which provides a suitable physical barrier to protect the read sensor layers from the CMP pad. A second photoresist structure 1302 of FIG. 13 is then formed in a central region over the read sensor layers (step 204 of FIG. 2) (see e.g. page 9 at lines

22-28). The read sensor layers are etched such that the end portions of the read sensor layers are removed and a central portion remains underneath the second photoresist structure, to thereby define a trackwidth for the read sensor (step 208 of FIG. 2).

B. Summary of Independent Claim 12. Independent claim 12 relates to a related method for use in making a read sensor for a magnetic head. In a *first part* of the recited method (see general flowchart of FIG. 1), a stripe height for the read sensor is defined by the following steps. A first chemical-mechanical polishing (CMP) protective layer 202 of FIG. 4 is formed over a plurality of read sensor layers (step 104 of FIG. 1) (see e.g. page 6 at lines 25-30). Subsequently, a first photoresist structure 302 of FIG. 5 is formed in a central region over the read sensor layers (step 106 of FIG. 1) (see e.g. page 7 at lines 1-19). A reactive ion etching (RIE) 304 of FIG. 5 is then performed to remove end portions of the first CMP protective layer in end regions which surround the central region without removing any of the read sensor layers (step 108 of FIG. 1) (see e.g. page 7 at lines 20-26), to thereby leave intact both a central protective portion of the first CMP protective layer underneath the first photoresist structure and the read sensor layers. After the performing of the RIE and leaving the read sensor layers intact, an ion milling 406 of FIG. 6 of the read sensor layers is performed (step 110 of FIG. 1) (see e.g. page 7 at lines 27-30 to page 8 at lines 1-3) such that end portions of the read sensor layers are removed and a central sensor portion remains underneath the first photoresist structure. A second CMP protective layer 702 of FIG. 9 is then formed around the central protective portion (step 114 of FIG. 1) (see e.g. page 8 at lines 13-19). The first photoresist structure 302 of FIG. 9 is then removed through mechanical interaction with a CMP pad by compressing the first photoresist structure with the CMP pad until it reaches top surfaces of the first and the second CMP protective layers, which provide a suitable physical barrier to protect the read sensor layers from the CMP pad (step 116 of FIG. 1) (see e.g. page 8 at lines 20-27).

In a *second part* of the recited method (see general flowchart of FIG. 2), a trackwidth for the read sensor is subsequently defined by the following steps. A second photoresist structure 1302 of FIG. 13 is formed in a central region over the read sensor layers (step 204 of FIG. 2) (see e.g. page 9 at lines 22-28). The read sensor layers are then etched 1406 of FIG. 14 such that end portions of the read sensor layers are removed and a central portion remains underneath the second photoresist structure (step 208 of FIG. 2) (see e.g. page 10 at lines 8-14). The second photoresist structure 1304 of FIG. 18 is subsequently removed through mechanical interaction with a CMP pad (step 214 of FIG. 2) (see e.g. page 11 at lines 4-16).

C. Summary of Independent Claim 23. Independent claim 23 relates to another related method of forming a read sensor of a magnetic head. A photoresist 302 of FIG. 5 without undercuts is formed in a central region over a plurality of read sensor layers which have a chemical-mechanical polishing (CMP) protective layer formed thereover (step 106 of FIG. 1) (see e.g. page 7 at lines 1-19). A reactive ion etching (RIE) 304 of FIG. 5 is then performed to remove end portions of the CMP protective layer in end regions which surround the central region without removing the read sensor layers (step 108 of FIG. 1) (see e.g. page 7 at lines 20-26), to thereby leave intact both a central protective portion of the CMP protective layer underneath the first photoresist structure and the read sensor layers. After the RIE, the read sensor layers are ion milled 406 of FIG. 6 such that end portions of the read sensor layers are removed in the end regions and a central sensor portion remains underneath the photoresist (step 110 of FIG. 1) (see e.g. page 7 at lines 27-30 to page 8 lines 1-3), to thereby define a stripe height for the read sensor. An insulator layer 602 of FIG. 8 is formed around the read sensor where the end portions were removed (step 112 of FIG. 1) (see e.g. page 8 at lines 4-12). A second CMP protective layer 702 of FIG. 9 is also formed around the central CMP protective portion (step 202 of FIG. 2) (see e.g. page 9 at lines 16-21). The photoresist 302 of FIG. 9 is then removed through

mechanical interaction with a CMP pad (step 116 of FIG. 1) (see e.g. page 8 at lines 20-27), where the read sensor and the insulator layer are protected by the central CMP protective portion and the second CMP protective layer from the mechanical interaction with the CMP pad.

6. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The following grounds of rejection are presented for consideration in the Argument section for Appeal:

All pending claims 1-2, 4, 6, 8-16, 18, and 21-30 of the present application are rejected under 35 U.S.C. § 103(a) based on U.S. Patent No. 6,315,875 to Sasaki and U.S. Patent Application Publication No. US2004/0027730 to Lille.

In particular, claims 1, 2, 4, 6, 8-16, 23-26, and 28-38 stand finally rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,315,875 to Sasaki in view of U.S. Patent Application Publication No. US2004/0027730 to Lille. In addition, claims 21 and 27 stand finally rejected under 35 U.S.C. § 103(a) as being unpatentable over Sasaki and Lille, and further in view of U.S. Patent Application Publication US2002/0030443 to Konuma et al. Finally, claims 21 and 27 stand finally rejected under 35 U.S.C. § 103(a) as being unpatentable over Sasaki and Lille, and further in view of Applicants' Admitted Prior Art.

7. ARGUMENT

All pending claims 1-2, 4, 6, 8-16, 18, and 21-30 of the present application are rejected under 35 U.S.C. § 103(a) based on U.S. Patent No. 6,315,875 to Sasaki and U.S. Patent Application Publication No. US2004/0027730 to Lille.

The issue is whether an adequate reason exists under 35 U.S.C. § 103(a) why one ordinarily skilled in the art would have combined/modified the teachings of the references as asserted by the Examiner to produce that which is claimed.

For an appropriate 35 U.S.C. § 103(a) rejection, the prior art in combination must teach or suggest each and every limitation in the claims. In addition, there must be a proper obviousness/non-obviousness assessment that includes some adequate reasoning and/or demonstration that one ordinarily skilled in the art would have combined the teachings of the references to produce that which is claimed.

When considering various prior art teachings for an obviousness/non-obviousness determination under §103,

> the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background the obviousness or non-obviousness of the subject matter is determined. Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented. *Graham vs. John Deere Co. of Kansas City*, 383 U.S. 1, pp 17-18 (1966).

In this analysis, a functional approach may be taken which asks whether the improvement of the presented invention is more than a predictable use of prior art elements according to their established functions. It is also helpful and instructive to consider whether there is any teaching, suggestion, or motivation to combine the

teachings of the references, either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art, in a flexible and non-rigid manner. The reason or evidence of a motivation to combine teachings need not be found explicitly in the prior art references, as one may also "look to interrelated teachings of multiple patents; the effects of demands know to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art." *KSR Int'l Co. v. Teleflex Inc. et al.*, 127 S.Ct. 1727, at 1740-41.

The Examiner's proposed reasoning for modifying the teachings of Sasaki fail. The Applicants respectfully submit that no adequate reasoning or demonstration of obviousness has been made with respect to the present claims, for demonstrating that one of ordinary skill in the art would have combined the teachings of the prior art references to produce that which is claimed.

All claims recite that a protective layer utilized in the present invention is a *chemical-mechanical polishing (CMP) protective layer*. This layer is different from a protective capping layer of tantalum (e.g. compare with Sasaki). A capping layer of tantalum does not provide a suitable barrier to a CMP pad during a CMP lift-off process. If it did, for example, no CMP protective layer (e.g. carbon) would ever be needed to protect the read sensor from the CMP pad. To construe the terminology "CMP protective layer" any differently so as to be or include a capping layer of tantalum, would be to construe the terminology in an <u>unreasonable</u> manner to one ordinarily skilled in the art.

In connection with this terminology, the claims of the present application recite related processes which include (e.g. using claim 1 as a reference):

> performing a reactive ion etching (RIE) to remove end portions of the CMP protective layer in end regions which surround the central

> region without removing any of the read sensor layers, to thereby leave intact both a central protective portion of the CMP protective layer underneath the first photoresist structure and the read sensor layers;
>
> after performing the RIE and leaving the read sensor layers intact, performing an ion milling of the read sensor layers such that end portions of the read sensor layers are removed in the end regions and a central sensor portion remains underneath the first photoresist structure, to thereby define a stripe height for the read sensor

A. <u>One Ordinarily Skilled In The Art Would Not Have Been Inclined To Eliminate The Top Capping Layer Of Sasaki And Replace It With A CMP Protective Layer</u>.

In the final rejection of claims, the Examiner states the following:

> Sasaki does not expressly teach that the protective layer is a CMP protective layer that provides a suitable physical barrier to protect the read sensors from the CMP pad.
>
> Lille teaches that the first protective layer 908 can be made of a CMP protective material. (Paragraph 53)
>
> It would have been obvious to one of ordinary skill in the art to modify the protective layer taught by Sasaki to form it of a CMP protective material, as taught by Lille. The motivation for doing so, as taught by Lille (Paragraph 53), would have been to help prevent mechanical dishing into the read sensor when the resist is removed by CMP.

As indicated above, to maintain all obviousness rejections, *the Examiner essentially argues that one ordinarily skilled in the art would be inclined to eliminate the top capping layer (e.g. tantalum) of Sasaki and replace it with a chemical-mechanical polishing (CMP) protective layer (e.g. carbon).*

In response, the Applicants respectfully disagree with this proposal. The Applicants respectfully submit that one ordinarily skilled in the art would not have been readily inclined to eliminate a top tantalum capping layer from a read sensor of Sasaki for the reasons provided by the Examiner.

Top capping layers made of tantalum for read sensors have been in ubiquitous use in the industry for several years for *protecting* read sensors. Top capping layers may also be carefully designed in read sensors to help maintain good MR coefficients for the read sensors. Thus, top capping layers of tantalum have served these important purposes in read sensors.

On the other hand, a chemical-mechanical polishing (CMP) protective layer made of carbon, for example, would <u>not</u> provide the necessary protection equivalent to that of a top capping layer of tantalum.

Clearly, the standard ubiquitous practice of utilizing top capping layers made of tantalum for needed sensor protection would obviously defeat any alternative speculative and hindsight-reconstructive argument fashioned by the Examiner to "help prevent mechanical dishing into the read sensor when the resist is removed by CMP."

In the Advisory Action of 25 September 2007, the Examiner's only response to these arguments was the following:

> ...the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See In re Keller, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). Examiner maintains that one of ordinary skill in the art, informed by Lille's teaching that a protective layer can be made of a CMP protective material (and also already informed by Lille's teaching that using CMP to remove a photoresist itself has additional benefits), would have been motivated with a reasonable expectation of success to modify the top capping layer to form a layer of CMP protective material taught by Lille.

The Examiner's argument above is not persuasive, however. The proper test under 35 U.S.C. § 103(a) is not, or not only, whether one ordinarily skilled in the art would have been motivated to combine/modify teachings based on *any reasonable expectation of success*. Rather, there must have been some adequate reason why one ordinarily skilled in the art would have modified the teachings of the references to produce that which is claimed, given the various factors and considerations outlined earlier above.

In the present case, since standard ubiquitous practice utilizing top capping layers for protection (e.g. tantalum), as evidenced even in Sasaki, clearly outweighs and even teaches away from the Examiner's fashioned modification, the Examiner's argument to modify the teachings of the prior art fails. There is no evidence that one ordinarily skilled in the art would have been motivated to eliminate a well-served, top tantalum capping layer of a read sensor as asserted by the Examiner. Even if the obviousness test were based only on any reasonable expectation of success as suggested by the Examiner, it is believed that such resulting read sensor having no top capping layer (e.g. no tantalum) would be damaged or more easily prone to damage, which would not be a successful outcome.

As there is no adequate reason why one ordinarily skilled in the art would have modified the teachings of the references as the Examiner suggests, the subject matter as defined by the claims is non-obvious over the prior art of record. The Applicants respectfully request the Examiner to withdraw all claim rejections and allow the application.

B. <u>Considering The Only Other Alternative To (A) Above – That A CMP Protective Layer Would Be Utilized In Combination With The Top Capping Layer – The Prior Art In Combination Fails To Teach Or Suggest The Step Of Etching "Without Removing Any Of The Read Sensor Layers" As Claimed.</u>

Considering the alternative – that the Examiner is arguing that a CMP protective layer of Lille would be utilized *in combination with* the top capping layer of tantalum of Sasaki (which is <u>not</u> argued by the Examiner) – the Examiner's reasoning still fails. If this argumentation were to be utilized, there is no adequate reason why one ordinarily skilled in the art would utilize a RIE in the end regions of the read sensor *without removing any of the read sensor layers* as claimed. Such a step would run <u>counter</u> to the teachings of Sasaki. The reason is that Sasaki emphasizes a first etching step for etching *some of the layers making up the GMR element*. See e.g. the Abstract of Sasaki. Some of these layers <u>must</u> include <u>at least the top capping layer of tantalum</u> (e.g. see column 11 at line 58 of Sasaki). In contrast, however, in the present claims it is recited that the RIE fails to etch the read sensor layers.

To further illustrate this point, the Examiner previously made the following argument in attempt to demonstrate the §103 rejections:

> "[t]he motivation for making such a modification would have been to better accomplish the goal disclosed by Sasaki of exploiting the differences between the RIE and the ion milling to ensure that the layers underneath the read sensor layers are not damaged when the read sensor layers are removed. Sasaki teaches that performing only RIE would damage the underlying shield gap layer 4a, whereas removing the read sensor layers by ion milling keeps the shield gap layer from being damaged. (Column 12, Lines 11-62) In other words, using the RIE to remove only the protective layer, as taught by Lille, would further insure that the RIE is unable to damage the shield gap layer, as desired by Sasaki.

The Applicants respectfully disagree with the Examiner's above assessment. One of the goals of Sasaki is to prevent the over-etching of read sensor materials with the ion milling process. See e.g. Sasaki at column 3 at lines 66-67 through column 4 at lines 1-10, stating *the problem of conventional techniques*:

> ...over-etching is required to some extent when the layers 105a, 105b, 105c are etched through ion milling. Consequently, as shown in FIG. 22, the very thin first shield gap film 104a having a thickness of 20 to 40 nm may be damaged or etched and holes may be thus formed in the shield gap film 104a. If the conductive layers 106 are formed, as shown in FIG. 23, while the first shield gap film 104a has holes, a short circuit is created between the bottom shield layer 103 and the conductive layers 106. Such a short circuit results in an increase in noise that affects the GMR element 105.

To help overcome this problem, Sasaki initially uses a RIE process to etch at least some of the read sensor layers of the GMR element and subsequently uses an ion milling process to etch the remaining read sensor layers. In Sasaki, at least some of the read sensor layers etched with the RIE include the free layer of the GMR element (see e.g. 12:14-18: "The first etching is performed to etch some of the layers making up the GMR element 5, that is, a part of the thickness of the layers from the top surface. For example, this etching is performed at least as deep as the free layer 5c"). This way, the time required of the subsequent second etching (i.e. ion milling) is kept short in order to prevent over-etching and damage to the sensor of Sasaki. See e.g. Sasaki at column 12 at lines 48-54:

> The second etching step is performed to etch only some of the layers making up the GMR element 5, instead of etching all of these layers. Therefore, the time required for performing the second etching is short. As a result, very little damage is done to the first shield gap film 4a even through ion milling is performed as the second etching.

This is the solution which Sasaki proposes.

If Sasaki were modified such that only the CMP protective layer which covers the read sensor was removed by RIE, then the undesirable outcome described in relation to columns 3-4 would be practiced. That is, the second etching step of Sasaki (i.e. the ion milling) would be employed to etch through the entire read sensor and cause undesirable sensor damage. As apparent, Sasaki teaches away from such technique.

See e.g. *In re Rudko*, Civ. App. No. 98-1505 (Fed. Cir. May 14, 1999). Thus, there is no associated teaching, or adequate suggestion or motivation to combine the teachings of Lille and Sasaki, as suggested by the Examiner.

The Examiner further asserted that the motivation to combine the teachings to result in the present invention would have been to better accomplish the goal disclosed by Sasaki, to exploit the differences between the RIE and the ion milling to ensure that the layers underneath the read sensors are not damaged when the read sensor layers are removed. Certainly, however, for Sasaki to <u>refrain</u> from applying the RIE to <u>any</u> of its read sensor layers would be to propose techniques which provide the <u>undesirable</u> results of the prior art, according to Sasaki.

Thus, even assuming that a CMP protective layer were formed over the read sensor of Sasaki, and even assuming that a RIE process were used to etch away only this CMP protective layer to leave the remaining read sensor layers of Sasaki intact, then the result would be that the ion milling process is used to mill away <u>all</u> read sensor layers of Sasaki – which would lead to the undesirable read sensor damage. Again, some of these layers which are etched away in Sasaki must include at least the top capping layer of tantalum (e.g. see column 11 at line 58 of Sasaki). In contrast, in the present claims it is recited that the RIE fails to etch the read sensor layers.

Again, the technique of the present disclosure requires a RIE of a CMP protective layer "without removing any of the read sensor layers" … "to thereby leave intact … the read sensor layers." An "ion milling" is performed "after performing the RIE and leaving the read sensor layers intact." The prior art alone or in combination fail to teach or suggest the same.

Based on the above, since there is no adequate reasoning and/or demonstration that one ordinarily skilled in the art would have modify the teachings of the references as

the Examiner suggests, the subject matter as defined by the claims is non-obvious over the prior art of record. The Applicants respectfully request the Examiner to withdraw all claim rejections and allow the application.

C. Other Reasons Provided By The Examiner Also Fail. In the Office Action of 05 April 2007, the Examiner argues two reasons regarding why the making of the modification of Sasaki does not defeat the objective of Sasaki. The Examiner's *first reason* is that "[e]ven if the first step of the etching method were only used to remove the protection layer (which Sasaki calls part of the GMR element 5), the second step of the etching method would take less time than otherwise, still allowing the goal of Sasaki to be attained" (see page 21 of the Office Action). However, the first Examiner's reason is incorrect because then Sasaki fails to teaching "without removing of the read sensor layers." If a CMP protective layer were added on top of the top tantalum capping layer of Sasaki, then the remaining read sensor layers, which would be left intact for ion milling per the claimed processes, would be all read sensor layers of Sasaki (e.g. including Sasaki's tantalum capping layer), and this would undesirably take the same amount of time (not less time) to be etched.

The Examiner's *second reason* regarding why the making of the modification of Sasaki does not defeat the objective of Sasaki is that "[t]he conventional method taught by Sasaki is still a viable, workable process, which Sasaki simply seeks to improve upon" and that "Sasaki does not teach away from the conventional method, but rather teaches a better way" (see page 21 of the Office Action). However, the Examiner's second reason fails because it assumes too much. *Specifically, the rejection of claims made by the Examiner is not based on alternative teachings of conventional techniques stated in column 3 of Sasaki, but rather in relation to the teachings in columns 11, 12, and 13 of Sasaki.* The Examiner even makes admissions that make it clear what the particular basis of the rejections are: "Sasaki does not expressly teach that the RIE is performed without removing any of the read sensor

layers" (see e.g. rejection of claim 1 on page 3 of the previous Office Action). In addition, the Examiner assumes that the method described in relation to column 3 of Sasaki ("conventional techniques") is the same as the method described in relation to columns 11-13, except for the RIE process. However, this assumes too much. For example: no part of the stripe height definition is described in relation to column 3 of Sasaki. As apparent, the Examiner cannot mix and match the teachings (i.e. unrelated steps and processes and materials) in Sasaki as desired.

In light of the above, the Applicants submit that the pending claims are allowable over the prior art of record and the application is in a condition suitable for allowance. As all pending claims 1-2, 4, 6, 8-16, 18, and 21-30 are novel and non-obvious over the prior art of record, the Applicants respectfully request the § 103 rejections to be withdrawn and the application allowed.

8. CLAIMS APPENDIX

1. (Previously Presented) A method for use in forming a read sensor for a magnetic head, comprising:

forming a chemical-mechanical polishing (CMP) protective layer over a plurality of read sensor layers;

forming a first photoresist structure in a central region over the read sensor layers;

performing a reactive ion etching (RIE) to remove end portions of the CMP protective layer in end regions which surround the central region without removing any of the read sensor layers, to thereby leave intact both a central protective portion of the CMP protective layer underneath the first photoresist structure and the read sensor layers;

after performing the RIE and leaving the read sensor layers intact, performing an ion milling of the read sensor layers such that end portions of the read sensor layers are removed in the end regions and a central sensor portion remains underneath the first photoresist structure, to thereby define a stripe height for the read sensor;

forming an insulator layer around the read sensor where the end portions were removed;

removing the first photoresist structure through mechanical interaction with a CMP pad by compressing the first photoresist structure with the CMP pad until it reaches a top surface of the CMP protective layer, which provides a suitable physical barrier to protect the read sensor layers from the CMP pad;

forming a second photoresist structure in a central region over the read sensor layers; and

etching the read sensor layers such that the end portions of the read sensor layers are removed and a central portion remains underneath the second photoresist structure, to thereby define a trackwidth for the read sensor.

2. (Previously Presented) The method of claim 1, wherein the first photoresist structure is formed without an undercut.

3. (Canceled)

4. (Previously Presented) The method of claim 1, further comprising:

depositing hard bias and lead layers around the read sensor; and

removing the second photoresist structure through mechanical interaction with a CMP pad.

5. (Canceled)

6. (Previously Presented) The method of claim 1, wherein the act of removing the first photoresist structure comprises mechanically compressing the first photoresist structure with the CMP pad.

7. (Canceled)

8. (Previously Presented) The method of claim 1, wherein the CMP protective layer comprises a first CMP protective layer and the method further comprising:

prior to removing the first photoresist structure, forming a second CMP protective layer over materials which surround the read sensor layers; and

wherein the materials comprise insulator materials.

9. (Previously Presented) The method of claim 1, further comprising:

prior to removing the first photoresist structure, forming a second CMP protective layer over materials which surround the read sensor layers to a thickness of between about 100 – 200 Angstroms.

10. (Previously Presented) The method of claim 1, wherein the CMP protective layer comprises a first CMP protective layer and the method further comprising:

prior to removing the first photoresist structure, forming a second CMP protective layer over materials which surround the read sensor layers; and

wherein the first and the second CMP protective layers comprise carbon.

11. (Previously Presented) The method of claim 1, further comprising:

removing the central CMP protective portion by RIE prior to forming the second photoresist structure.

12. (Previously Presented) A method for use in making a read sensor for a magnetic head, comprising:

defining a stripe height for the read sensor by:

forming a first chemical-mechanical polishing (CMP) protective layer over a plurality of read sensor layers;

forming a first photoresist structure in a central region over the read sensor layers;

performing a reactive ion etching (RIE) to remove end portions of the first CMP protective layer in end regions which surround the central region without removing any of the read sensor layers, to thereby leave intact both a central protective portion of the first CMP protective layer underneath the first photoresist structure and the read sensor layers;

after the performing of the RIE and leaving the read sensor layers intact, performing an ion milling of the read sensor layers such that end portions of the read sensor layers are removed and a central sensor portion remains underneath the first photoresist structure;

forming a second CMP protective layer around the central protective portion;

removing the first photoresist structure through mechanical interaction with a CMP pad by compressing the first photoresist structure with the CMP pad until it reaches top surfaces of the first and the second CMP protective layers, which provide a suitable physical barrier to protect the read sensor layers from the CMP pad;

subsequently defining a trackwidth for the read sensor by:

forming a second photoresist structure in a central region over the read sensor layers;

etching the read sensor layers such that end portions of the read sensor layers are removed and a central portion remains underneath the second photoresist structure; and

removing the second photoresist structure through mechanical interaction with a CMP pad.

13. (Previously Presented) The method of claim 12, further comprising:

after etching the read sensor layers with use of the first photoresist structure, forming an insulator layer around the read sensor where the end portions were removed, which is protected by the second CMP protective layer from the CMP pad when the first photoresist structure is removed.

14. (Previously Presented) The method of claim 12, further comprising:

after etching the read sensor layers with use of the first photoresist structure, forming an insulator layer around the read sensor where the end portions were removed, which is protected by the second CMP protective layer from the CMP pad when the first photoresist structure is removed; and

after etching the read sensor layers with use of the second photoresist structure, forming hard bias and lead layers around the read sensor where the end portions were removed.

15. (Previously Presented) The method of claim 12, wherein the first and the second photoresist structures are formed without undercuts.

16. (Previously Presented) The method of claim 12, wherein the act of removing the first photoresist structure comprises mechanically compressing the first photoresist structure with the CMP pad.

17. (Canceled)

18. (Previously Presented) The method of claim 12, wherein the first and the second CMP protective layers comprise carbon.

19. (Canceled)

20. (Canceled)

21. (Previously Presented) The method of claim 12, wherein the first and the second CMP protective layers comprise carbon having a hardness of about 22 GPa.

22. (Previously Presented) The method of claim 12, wherein the first and the second photoresist structures are formed without undercuts and the method further comprises:

exposing the second photoresist structure to a solvent prior to removing the second photoresist structure.

23. (Previously Presented) A method of forming a read sensor of a magnetic head, comprising:

forming a photoresist without undercuts in a central region over a plurality of read sensor layers which have a chemical-mechanical polishing (CMP) protective layer formed thereover;

reactive ion etching (RIE) to remove end portions of the CMP protective layer in end regions which surround the central region without removing the read sensor layers, to thereby leave intact both a central protective portion of the CMP protective layer underneath the first photoresist structure and the read sensor layers;

after the RIE, ion milling the read sensor layers such that end portions of the read sensor layers are removed in the end regions and a central sensor portion remains underneath the photoresist, to thereby define a stripe height for the read sensor;

forming an insulator layer around the read sensor where the end portions were removed;

forming a second CMP protective layer around the central CMP protective portion; and

removing the photoresist through mechanical interaction with a CMP pad, where the read sensor and the insulator layer are protected by the central CMP protective portion and the second CMP protective layer from the mechanical interaction with the CMP pad.

24. (Previously Presented) The method of claim 23, wherein the photoresist comprises a first photoresist and the method further comprises:

after defining the stripe height for the read sensor:

forming a second photoresist without undercuts in a central region over the read sensor layers; and

etching the read sensor layers such that end portions of the read sensor layers are removed and a central portion remains underneath the second photoresist, to thereby define a trackwidth for the read sensor.

25. (Previously Presented) The method of claim 23, wherein the photoresist comprises a first photoresist and the method further comprises:

after defining the stripe height for the read sensor:

forming a second photoresist without undercuts in a central region over the read sensor layers;

etching the read sensor layers such that end portions of the read sensor layers are removed and a central portion remains underneath the second photoresist, to thereby define a trackwidth for the read sensor; and

removing the second photoresist through mechanical interaction with a CMP pad.

26. (Previously Presented) The method of claim 23, wherein the first and the second CMP protective layers comprise carbon.

27. (Previously Presented) The method of claim 23, wherein the first and the second CMP protective layers comprise carbon having a hardness of about 22 GPa.

28. (Previously Presented) The method of claim 23, wherein the first and the second CMP protective layers are formed to a thickness of between about 100 – 200 Angstroms.

29. (Previously Presented) The method of claim 23, wherein the first and the second CMP protective layers are formed over the read sensor layers.

30. (Previously Presented) The method of claim 23, further comprising: removing the central CMP protective portion and the second CMP protective layer by RIE.

9. EVIDENCE APPENDIX

There is no evidence necessary to provide at this time of the proceedings.

10. RELATED PROCEEDINGS APPENDIX

There are no related proceedings associated with this application.

Based on the above, the Applicants respectfully submit that the Examiner's Section 103(a) rejections are unwarranted. It is believed that pending claims 1-2, 4, 6, 8-16, 18, and 21-30 are allowable over the prior art of record and the application is in a condition suitable for allowance.

Thank you for your consideration. The Board is invited to contact the undersigned if necessary to expedite prosecution of this case.

Respectfully Submitted,

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